

Community Structure in Goose Barnacle and Sea Mussel Beds off British Columbia, Canada, and the Likely Ecological Impacts of Goose Barnacle Harvesting

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Extended Abstract

Goose barnacles (*Pollicipes polymerus*) have been harvested off the west coast of Vancouver Island since 1985. In 1998, establishment of a sea mussel (*Mytilus californianus*) fishery was proposed. However, following introduction of the Oceans Act in 1997, Fisheries and Oceans Canada (DFO) became mandated to manage at an ecosystem level. Following recent review of the potential implications of a sea mussel fishery, establishment of such a fishery was rejected because analysis indicated that sea mussels played an important structural role in the exposed rocky intertidal ecosystem and that harvesting this species would likely have significant negative ecological impacts. This exercise also raised attention to the existing goose barnacle fishery. Since the ecological role of this species was also structural, and fishery implications had not previously been thoroughly investigated, this fishery was closed indefinitely in January, 1999, until appropriate evaluation studies could be done. Studies were initiated in 2000, and objectives were to

1. Evaluate the ecological role of goose barnacles in the exposed rocky intertidal.
2. To conduct a goose barnacle stock assessment.
3. To make management recommendations on how a goose barnacle fishery, if reopened, should proceed.

Here, we present preliminary results from our analysis of goose barnacle/sea mussel community structure and observations of how experienced fishers harvest goose barnacles.

In July, 2000, 29 quadrat samples of the intertidal community were collected off Ucluelet and Tofino, British Columbia. Analyses presented were for species present, species size structure, and species associations, with comments on future planned studies.

At all sites, it was evident that species diversity within the intertidal zone is complex and is a function of matrix (the combined layer of living animals, dead shells and associated debris) thickness. Approximately 142 species were found at the sample sites, and species consisted predominately of *Mytilus californianus*, *Balanus glandula*, *Semibalanus cariosus*, *Pollicipes polymerus*, *Bryozoan sp.*, *Piaster ochraceus*, *Petrolisthes sp.*, *Pachycheles sp.*, *Lottia sp.*, *Margarites sp.*, *Amphissa sp.*, *Cirolana barfordi*, *Jassa falcata*, and *Cucumaria pseudocurata*. Gastropods represented approximately 40% of the species present in the reference collection compiled, marine arthropods 20%, and annelids 16%. The remaining 24% of the species observed consisted of echinoderms (7%), molluscs (5%), cnidarians (3%), unknowns (4%); and insects, chordates, and sipunculus.

Peak mussel and barnacle counts were observed to be evenly distributed at an intertidal elevation of 2-4 m above chart datum. Mussel size increased with an increase in matrix depth ($r^2 = 0.67$). There was no correlation observed between barnacle size and matrix depth ($r^2 = 0.04$). Species evenness decreased slightly with an increase in matrix depth ($r^2 = 0.62$) while species diversity slightly increased ($r^2 = 0.37$).

During the experimental harvest, fishers demonstrated traditional commercial harvesting techniques. Experienced fishers typically selected fist-sized "colonies" of goose barnacles from a sea mussel or acorn barnacle matrix and pried the colony off with a long flat steel bar. This harvest method, when conducted properly, left divot holes in the mussel layer or patches of bare rock in acorn barnacle areas. Observations three months after harvesting indicated that the holes created had largely filled in through realignment of nearby sea mussels. Scars of intensively harvested areas were visible at most sites, but the experienced fisher involved in assisting us claimed most of these impacts were due to inexperienced harvesters.

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Future activities within the goose barnacle study will include the continued analysis of data collected in 2000 as well as establishment of long-term study impact sites to investigate succession and recruitment rates following barnacle harvesting. Completion of the taxonomic identification of associated species and continued identification, mapping, and stock assessment of exploitable areas are also priorities. Any future experimental harvests conducted will be monitored by DFO to assess the full nature of harvesting impacts and potential fishery changes in targeted harvestable product over time.